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Student Shannon Buckley changed a filter last week in an air-quality measuring device at the University of New Hampshire Observatory Station at Thompson Farm in Durham. (Globe Staff Photo / Joanne Rathe)

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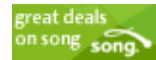
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Asian grit aloft in New England

The Boston Globe

Pollutants found to travel globally

By Stephanie Ebbert, Globe Staff | August 9, 2004

PORTSMOUTH, N.H. -- Scientists engaged in a major study of air quality and climate change have discovered pollutants from Asia hanging high over New England and the Atlantic this summer -- one of the early surprises of research aimed at clarifying how smokestack and auto emissions travel and change in the atmosphere.

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The discovery marks the first time Asian pollution plumes have been observed over the East Coast, and it suggests that improvements in American air quality could be threatened as Asian countries rapidly become more industrialized, one lead researcher said.

"We have to be concerned whether the cost of continuing to ratchet up emission controls is not going to be offset by growing pollution coming to us from Asia," said Daniel J. Jacob, a Harvard University researcher who is serving as deputy mission scientist for the intensive, six-week study. "At some point, it may be cheaper to sell pollution control equipment to China."

The dark, sooty clouds, containing ozone and fine particles, were spotted far above

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Portsmouth and other locations during flights this summer for the International Consortium for Atmospheric Research on Transport and Transformation, or ICARTT, an air quality study billed as the largest, most comprehensive ever done.

Teams of scientists, working aboard a dozen aircraft including a NASA DC-8, have been tracking air masses and measuring pollutants, ascending and descending to collect air samples through probes inserted through airplane windows. Some of the planes are literally chasing pollution, flying into plumes rising from Pennsylvania power plants or tag-teaming with aircraft over the Atlantic to track the emissions into Europe.

The researchers from six countries, who also are using a research ship and balloons rigged with ozone sensors that drift along with plumes of pollution, could end up challenging the assumptions that policymakers have long relied upon. The six-week study began July 5 and will end this month.

"I think what you're going to see in five to 10 years' time, when you get a better handle on the long-range transport, is that pollution is traveling from continent to continent and there may need to be some new agreements put into place," said Robert Talbot, a study leader who also directs the University of New Hampshire's Atmospheric Investigation, Regional Modeling, Analysis, and Prediction program, also known as AIRMAP. "I don't think we had the knowledge that it was quite so extensive and quite so long-range. Papers are starting to appear saying it may be difficult for several Pacific cities to meet pollution standards because of Asia."

Conversely, he believes that the results of a parallel New England Air Quality Study may surprise this region, which often claims the mantle of the "tailpipe of the nation" and is too quick to blame other regions for creating the smog that drifts in on prevailing winds and gets stuck here.

"I think there's quite a bit of pollution generated within the region that we're not really recognizing," said Talbot. "There could be some eye-opening results in that respect."

Science has demonstrated that air pollution knows no borders. Three years ago, an Asian storm sent dust across the United States, sprinkling it as far as New Hampshire. Forest fires raging through Quebec in 2002 blanketed New England, and much of the East Coast, with a thick haze. And divisive battles have long been fought over border-crossing gases. In recent years, Northeastern states have been suing over the pollution blown their way from the Midwest, blaming power plants for producing acid rain and ozone, and, most recently, exacerbating global warming. In 1991, the United States signed a treaty with Canada agreeing to reduce US emissions blamed for spoiling lakes and forests with acid rain.

The latest research could shift the world balance again, as the United States quantifies the pollution it sends to Europe and collects from Asia.

"Right now, there's a lot of interest in the community about this influence of Asian pollution and whether it can compromise our ability to achieve regional air quality objectives," said Harvard's Jacob.

Scientists from the National Oceanic and Atmospheric Administration and the National Aeronautics and Space Administration are leading the study, which also aims to improve the modeling behind new, hourly air-quality forecasts being launched this fall by the US Environmental Protection Agency and NOAA, to advise people with asthma or other respiratory ailments when anticipated high ground-level ozone levels will make breathing more difficult.

In addition, scientists hope to sharpen scientific understanding of aerosols, small particles or droplets that can cause haze to hang over New England's scenic vistas and contribute to respiratory and even cardiac problems. Because they reflect sunlight, aerosols are believed to offset some effects of greenhouse gases that trap heat in the atmosphere. But some also absorb light, and their complex effect on cloud formation presents scientists with the greatest remaining uncertainty surrounding the human contribution to climate change.

Technology has only recently advanced enough to allow a detailed analysis of the composition of the particles. Crouching below the wing of a plane last week, NOAA research scientist Chuck Brock examined a particle-mass spectrometer -- tucked into one of three large, bullet-shaped structures beneath the craft that take in outside air during

flight. The custom-made instrument vaporizes particles into gases to characterize their components.

The first phase of ICARTT's two-part study was intended to focus on transport of pollution from North America to Europe, with plans to study pollution imported from Asia in the spring of 2006. Model calculations told the researchers that pollution could travel as far as the Northeast, but they have been surprised by the magnitude and the time frame.

"We knew the transport from Asia was efficient in the spring, but we didn't know it was so prevalent in the summer," said Talbot.

Though the pollution drift is currently too high to affect air quality or health on the ground, it could contribute to regional climate change by increasing the levels of ozone, a greenhouse gas, said Hanwant Singh, NASA mission scientist. Or it could descend through the atmosphere through air mixing, and add to ground-level ozone already forming during summer months, when nitrogen oxides from vehicle exhausts and volatile organic compounds cook in the presence of sunlight.

The locations of the Asian air masses were predicted by meteorological modeling, and the pollution was positively identified through chemical fingerprints -- halocarbons produced only in Chinese industry, said Jacob.

Environmental advocates argued that the findings should point policymakers toward less factionalized approaches to improving air quality.

"I think the most profound thing that you draw from this is that the globe is one air shed," said Armond Cohen, director of the Clean Air Task Force, a Boston-based nonprofit. "We know that global warming is a global phenomenon, but I think scientists are just beginning to understand that emissions that come out of our cars and power plants also travel globally. The fact that we're being influenced by Asian air pollution also means that we are influencing Asia in turn."

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